Food Price Anomalies on Farmer Welfare and Inflation: A Case in Indonesia

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Abstract: This study aims to analyze the relationship between food price anomaly at the producer and final market level on farmer welfare and inflation in North Sumatra, Indonesia. The observation period is 2018-2022, using monthly data. The method used is quantitative descriptive, through independent-t different test tools, price variation coefficients, and their changes. Based on observations of price developments, it is known that of the eight commodities analyzed, only rice whose prices tend to be stable. The description of price developments among groups of business actors shows that the margins obtained by farmers due to price fluctuations are not as large as those obtained in the final market. The results of the different test show that the prices from farmers for eight food commodities experience significant differences compared to most groups of business actors. This implies that price increases in the final market do not have a significant impact on farmers' welfare. Based on the value of the coefficient of variation, rice, beef and cooking oil are food ingredients with very stable prices. The price of chicken eggs is stable, while the price of chicken meat is more volatile. Meanwhile, red chili and cayenne pepper have a large coefficient of variation. This has had quite a big impact on North Sumatra's inflation.

INTRODUCTION

Food is the most important basic human need and its fulfillment is part of the human rights guaranteed in the 1945 Constitution of the Republic of Indonesia. Fulfillment of food needs is also related to efforts to improve the quality of public health in order to obtain quality Indonesian resources that have high competitiveness. tough and superior as a nation. On the other hand, the problem of food insecurity is still an important issue that must be addressed immediately. On a world scale, FAO in 2010 estimates that more than 900 million people in the world will still be threatened by hunger and food insecurity. This is because currently food does not only function as food but also raw material for the biofuel industry so that there is competition in its use.

According to the USDA and Goldman Sachs Commodities Research (2014), since 2000 agricultural products are needed not only for food and feed needs, but also for energy. But for the next 10 years, the need for agricultural products for food and feed will still be dominant. The results of Puska PDN's research (2013) also show that the gap between demand and supply for some foods up to 2050 is getting bigger where the level of demand is greater than supply. These conditions allow for higher dependence on imports. This means that the dynamics of food in the country will be greatly influenced by the dynamics of food abroad.

Increases in food prices can be caused by various factors such as import policies, subsidies, and others (Umaroh et al., 2019). The prices of rice and soybeans are relatively more stable because these two products intersect with the government's import policy in order to meet domestic needs. Research conducted by Vu & Glewwe (2011) in Vietnam explains that increases in food prices generally increase the average social welfare. However, this average figure does not really represent a better condition because the number of households that have suffered losses is greater than the number of households that have benefited from the increase in food prices. As for the finding that welfare in general has increased, this is because the losses experienced by consumer households are smaller than the increase in welfare obtained by net sellers.

Indonesia is an agrarian country where most of the people's livelihoods are in the agricultural sector. The role of the agricultural sector in the national economy in 2021 was recorded at 13.28% but was able to provide jobs for 40.6

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million Indonesians (BPS, 2022). The agricultural sector is an important sector in supporting the Indonesian economy. Various products are exported, both in the form of commodities and industrial products, originating from the agricultural sector. However, on the other hand the characteristics of agricultural products can cause problems, one of which is price fluctuations. The fluctuating prices of agricultural commodities cause various problems. On a macro level, price fluctuations can cause broader problems, namely the inflation rate.

Inflation is a process of increasing general prices continuously. Inflation caused by price fluctuations or volatile prices that usually occur in foodstuffs in the agriculture, fishery and livestock sectors is called volatile food inflation. Bank Indonesia defines volatile food as inflation that is dominantly influenced by shocks in the foodstuffs group such as harvests, natural disturbances, or development factors in domestic food commodity prices as well as developments in international food commodity prices. Fluctuating volatile food prices contributed significantly to the inflation rate. Increases in food prices can fluctuate sharply and uncontrollably. Food price movements apart from being uncontrollable, are also unusual or can be said to be an anomaly (Satya, 2016).

From May to early June 2022, the prices of a number of food commodities showed an upward trend. The price of curly red chilies as of 31 May 2022 was recorded at IDR 53,000 per kilogram, up 14% from the position as of 24 May which was IDR 46,700 per kilogram. Likewise, the price of red chili was recorded at IDR 62,450 per kilogram, up 16.7% from the price of IDR 53,500 per kilogram. The increase also occurred in other commodities such as shallots, garlic, cayenne pepper. In fact, several food commodities have entered the harvest period such as chili and shallots (Anisah, 2022). The increase in food prices on the one hand made a positive contribution, namely increasing the welfare of farmers. However, on the other hand an increase in food prices can have an impact on reducing the level of food security, it will even result in a lower level of public nutrition/malnutrition, especially for the poor group of people.

Several previous studies have been conducted to estimate the impact of price policies on household welfare. Janvry & Sadoulet (2009) in their research conducted a simulation of rising grain and oil prices globally and their impact on household welfare in India. The results show that poor households in rural areas experience the greatest decrease in welfare among other household groups. However, the study did not identify the effect on changes in household consumption patterns. Vu & Glewwe (2011) in their research in Vietnam and Umaroh et al. (2019) who conducted research in Indonesia, both reported similar research results, namely that farm households and rural households experienced a smaller decline in welfare than non-farmer households and urban households. This research confirms that households that have a relationship with the agricultural sector have higher resilience when price increases occur because they are not only consumers but also producers so that their price effect can make them more resilient to crises.

However, research by Yuliana et al. (2019) obtained the opposite result where farming households experienced a

greater decline in welfare than non-farmer households during the price increase policy in Indonesia. Faharuddin (2020) conducted more specific research on a provincial scale in North Sulawesi where the results of his research showed that an increase in food commodities reduced household welfare. However, the effect is only emphasized on changes in food commodity prices without observing the impact on certain household groups. Meanwhile, Rahayu (2008) found that price policy had a positive effect on the welfare of farmers in West Java, East Java and Central Java through a supply side that benefited farmers but the impact was not analyzed if there was an increase in prices for consumers and producers. For this reason, this study aims to analyze the correlation between food price anomaly at the producer and final market levels on farmer welfare and inflation in North Sumatra.

LITERATURE REVIEW

Food Consumption Patterns

In general, consumers are responsive to price changes. The theory of demand that is widely known is the theory which states that an increase in price will reduce demand with the assumption ceteris paribus and applies to normal goods (Pindyck & Rubinfeld, 2013). Food products from agricultural products are generally normal goods. So a change in the price level will have an impact on the quantity demanded. However, because food commodities have a relatively low price elasticity (inelastic), it is unlikely that an increase in price will reduce demand in larger quantities. Because food products are basic needs that must be met, rising food prices will have an impact on the allocation of costs for food to be higher. For people with middle to lower economic conditions, this consequence can have an impact on decreasing levels of welfare.

The application of consumption demand theory to households requires a specific estimation model. Previous research used a complete demand system approach to analyze household consumption patterns by including price and income change variables (Agbola, 2000; Haider & Zaidi, 2017; Molina & Gil, 2005; Weber, 2015; Widarjono, 2012). According to Thanga (2013) it is flexible and meets all the requirements of the demand model. One of the newest demand system models used by many researchers is the Quadratic Almost Ideal Demand System (QUAIDS) model. QUAIDS is a development of the previous request system model, namely AIDS developed by Banks, Blundell, & Lewbel (1997). QUAIDS has a special feature that other demand system models do not have, namely the assumption of non-linearity of the Engel curve in total expenditure so that household consumption preferences may not be linear but non-linear in accordance with the level of household consumption expenditure. In addition, the QUAIDS model can also be used by incorporating demographic characteristics to capture household behavior.

Several empirical studies have confirmed the precise and appropriate results of QUAIDS in modeling household demand and show that the demand for food products is strongly influenced by price and income levels (Haq et al., 2011; Ogundari, 2012). In terms of prices between food products, research in Switzerland by Abdulai (2002) resulted

in the conclusion that food products containing protein are more inelastic than fatty food products. This shows that the more nutritional/nutritional content is needed in a food, the product will still be purchased by consumers even if there is a change in price. From the consumer side, the increase in food prices will still be redeemed even if they have to sacrifice spending for other needs. The results of this study are supported by the results of other studies, namely Agbola (2000) in India and Le (2008) in Vietnam. In general, households will inelastically respond to food products that are considered nutritious and a basic need, it's just that there is a slight difference in the amount of elasticity that is produced.

Farmer Welfare

Farmers are human resources who have high power for the welfare of society. Without the help of human farmers it will be difficult to survive. Therefore the existence of farmers is very important for human life. According to Sunarti and Khomsan (2006), the welfare of farmers can be realized through their increased income, minimal crop failures, increased productivity, and high prices for grain purchased. On the other hand, the factors that cause farmers to still not feel well-off and not yet advanced are due to several factors, including: (1) The middlemen buy cheap grain prices; (2) Lack of supply of subsidized fertilizers and plant seeds by the government; (3) Rice is imported by neighboring countries; (4) Difficult loans for farmers. One indicator that is considered important to determine the level of welfare of farmers can be seen through the Farmer's Exchange Rate (NTP). The higher the agricultural exchange rate, the higher the welfare level of farmers (Darwanto, 2005).

Farmers' Exchange Rate (NTP) is a comparison between the price index received by farmers (IT) and the price index paid by farmers (IB) in percentage terms. The farmer exchange rate is also an indicator used to measure the level of welfare or the purchasing power of farmers (Central Bureau of Statistics 2011). In general, there are three meanings of Farmer Exchange Rates (Ruauw 2010). First, if the NTP > 100, it means that farmers experience a surplus, the price of production increases more than consumption. Farmers' income increased more than their expenditure. Thus the level of welfare of farmers is better than the previous level of welfare of farmers. Second, NTP = 100, meaning that farmers experience a break even. The increase or decrease in the price of the goods it produces is equal to the percentage increase or decrease in the price of its consumption goods. The level of welfare of farmers has not changed. Third, NTP < 100, meaning that farmers experience a deficit. The increase in the price of production goods was relatively smaller than the increase in the price of consumption goods. The level of welfare of farmers in one period has decreased compared to the level of welfare of farmers in the previous period.

The Subsistence Exchange Rate (NTS) describes the measurement of the total income of an agricultural business against the total expenditure of farmers for their living needs (Suntoro et al., 2014). Agricultural business income is the sum of all production values of agricultural commodities produced by farmers. Farmers' expenditure is the sum of expenditures for household consumption and expenditures for farming production costs. Thus NTS describes the level of exchange/purchasing power from agricultural business

income from farming to farm household expenditures for their living needs which includes consumption expenditures and expenditures for production costs.

Conceptually, NTP measures the exchange power of agricultural commodities produced by farmers against products purchased by farmers for consumption and production purposes for farming. Farmers' low exchange rates make it difficult for them to meet other basic needs. The problem is a matter of life and death for farmers who own land and live only from agricultural products (Wunangun 2004).

Changes in household welfare due to price changes can be shown by money metrics or indirect utility functions (Umaroh, 2019). Better or worse utility can be calculated from the movement of the old utility level towards the new utility level in response to price changes. Referring to the study conducted by Akbari et al. (2013), the impact on welfare due to changes in food prices can be measured by compensating variation (CV). CV is the amount of money needed by a household when there is a price change to maintain the initial utility or utility before the price change occurs (Vu & Glewwe, 2015). In addition, Umaroh et al. (2019) explained that the use of CV can represent welfare that is immediately visible (immediate impact) or short term (short run) after a shock such as a change in the price level.

PREVIOUS STUDY

Research on changes in food commodity prices can have a direct impact on household consumption and an indirect impact on household welfare. The first study on the impact of changes in commodity prices on household welfare was conducted by Deaton (1989) in Thailand. Delton applies a nonparametric model approach known as the "Kernel Density Distribution". The results of the study found that an increase in rice prices would benefit the agricultural sector in rural areas and be able to improve household welfare. However, this welfare depends on the area of land owned by each household. Of the 11,893 agricultural households, 1,677 households experienced an increase in welfare, while around 3,001 households experienced a decrease in welfare. Barret and Dorosh (1996) also used a nonparametric approach to examine the impact of changes in food prices on the welfare of farmers in Madagascar. They found that most farmers in Madagascar were not directly involved in trading the commodities they produced either as buyers or sellers, with poor farmers experiencing the greatest decline in welfare.

Minot and Goletti (2000) investigated the impact of rice market liberalization in Vietnam. This study uses the Almost Ideal Demand System (AIDS) method to analyze the impact of this liberalization on farmers' income and poverty levels. This study found that only 45% of farmers benefited from market liberalization. Geographically, higher rice prices provide more benefits to rural households than urban households. On average, the loss of income experienced by farmers is about 2%. Vu & Glewwe (2011) investigated the impact of increased food prices on welfare and poverty levels in Vietnam. They also use the AIDS model. The results of the study show that a price increase of 20% for all products, assuming that consumer prices and producer prices increase proportionally, results in an increase in household

expenditure of up to 3.4%. If producer prices are higher than consumer prices, the welfare of agricultural households will improve.

Another study was conducted by Ivanic and Martin (2008) by applying the agricultural household model approach to estimate the impact of changes in food prices on poverty levels. This study analyzes cross-country studies, namely: Bolivia (2005), Cambodia (2003), Madagascar (2001), Malawi (2004), Nicaragua (2001), Pakistan (1999), Peru (2003), Zambia (1998), and Vietnam (1998 and 2004). In general, a 10% increase in food prices will result in a higher poverty rate. The impact of higher food prices depends on the type of product, geography and country. The impact is much bigger for urban households than for rural households because urban households are buyers of agricultural commodities. Attanasio et al. (2013) investigated changes in food prices in Mexico and Colombia by implementing the Quadratic Almost Ideal Demand System (QUAIDS). The results of the study show that an increase in income has an impact on the portion of expenditure, especially rice. Overall, the impact of rising food commodity prices is lower welfare. In other words, the price elasticity of demand is negative.

In Indonesia, studies on the impact of changes in food commodity prices on household welfare are carried out using standard microeconomic models or standard optimization models. For example, Ravallion and van der Walle (1991) analyzed the Almost Ideal Demand System (AIDS) using data taken from the 1981 SUSENAS. The study results show that trade liberalization in 1981 for various products, including rice, influenced the domestic price level. Lower market prices lead to higher poverty rates. Ikhsan (2003) conducted a study using the net benefit ratio approach proposed by Deaton (1997). Ikhsan's study found that a 10% increase in the price of rice only paid 1% to the poorest households, which number the equivalent of two million people. A study following a similar approach was adopted by McCulloch (2008), who used data from the 2004 SUSENAS. McCulloh's study reported that a 10% increase in price would result in 14% of households experiencing an increase in their welfare, but the remaining 86% experiencing a decrease. This decrease in welfare is equivalent to 2% of poor households, while non-poor households experience a lower relative income of 0.78%.

RESEARCH METHODS

The study was carried out with a quantitative approach. Quantitative approach to describe the pattern of linkages of food price anomalies to farmer welfare and inflation in North Sumatra. This study uses secondary data published by the Ministry of Agriculture and the Central Bureau of Statistics. The research sample is all districts/cities in North Sumatra from 2010 to 2021. The data collected includes secondary data, namely the Food Price Index.

To answer the problem, this research begins by using trend analysis techniques to see the development of selling prices at each level of business actors. Then, statistical descriptive analysis is used to map the lowest price, highest price, average price, and deviation of the developing price fluctuations. Observation of these results serves as a tool to see how much the fluctuations of each commodity price are.

Furthermore, the study uses the t-independent different test technique to justify whether or not there is a significant price difference between groups of business actor levels. The formula can be written as follows:

$$t = \frac{X_A - X_B}{\sqrt{\dfrac{S_A^2}{n_A} + \dfrac{S_B^2}{n_B}}} \quad \text{(1)}$$

Where X_A is the average score of the experimental group, X_B is the average score for the control group, S_A^2 is the variant of the experiment group, S_B^2 is the variant of the control group, n_A is the number of samples from the experimental group, and n_B is the number of samples from the control group. For hypothesis testing, then the t_count value is then compared to the t_{tabel} value. The method of determining t_{tabel} is based on the significance level (α) and dk = $dk = n_A + n_B - 2$.

Several studies on fluctuations in food prices have been carried out, such as Ramadhani & Sumanjaya (2014) regarding fluctuations in soybean prices, and Firdaus (2021) regarding disparities in strategic food prices before and during the Covid-19 pandemic. This study uses the coefficient of variation to measure the price volatility of eight food ingredients. The formula is as follows (Paradise, 2021):

$$CV = \frac{S_b}{x} \quad \text{(2)}$$

Where CV is the coefficient of variation, S_b is the standard deviation of food prices (rupiah), and x is the average food price (rupiah).

RESULTS AND DISCUSSION

Based The prices of food commodities analyzed in this study include rice, chicken meat, beef, chicken eggs, shallots, red chilies, bird's eye chilies and cooking oil. The analysis is divided into 3 focuses, first, exploring price developments, second, conducting different tests at each level of business actor, and third, analyzing price variations of the eight food commodities.

Development of Food Prices

Rice price fluctuations between producers and wholesalers and retailers are not that great. The lowest price of rice during 2019-2022 at the producer level is IDR 10,300 per kilogram and the highest price is IDR 10,750 per kilogram. The standard deviation or spread of the price of rice per kilogram from the average value at the producer level is quite low, namely 81.34. Thus, rice farmers do not enjoy a significant difference in rice prices. It can be said, the price of rice at the farmer (producer) level is relatively stable during 2019-2022.

Rice price fluctuations also did not occur at the wholesaler level, as indicated by the relatively low standard deviation value of 70.06. Even the standard deviation value is the lowest compared to prices in the trader group. This is because wholesalers keep rice prices relatively affordable, bearing in mind that the government also plays an important role in maintaining rice price stability. The biggest standard deviation for rice prices occurs in trading in the modern

market. In general, the type of rice traded in the modern market is premium rice, so the price is relatively more volatile because it depends on the price of rice on the international market. However, because the buyers of rice in the modern market are groups of people with middle to upper incomes, fluctuations in the price of rice in the modern market are still not considered that large.

Table 1. Statistical Description of Food Commodity Prices Per Kilogram at the Business Actor Group Level in 2019-2022.

	Minimum	Maximum	Mean	Std. Deviation
Rice				
Producer	10.300	10.750	10.493,02	81,34
Wholesale	10.300	10.600	10.420,93	70,06
Traditional Market	10.950	11.300	11.091,86	116,97
Modern Market	12.500	13.300	12.776,74	185,92
Chicken Meat				
Producer	16.600	25.750	22.091,86	2.159,75
Wholesale	18.750	28.100	23.270,93	2.114,41
Traditional Market	26.000	39.650	33.463,95	2.809,47
Modern Market	27.600	38.650	33.138,37	2.765,64
Beef				
Producer	103.200	116.100	108.340,70	3.469,38
Wholesale	110.350	126.950	116.152,33	3.967,89
Traditional Market	119.300	137.150	124.337,21	5.199,33
Modern Market	31.050	181.750	141.824,42	22.412,76
Chicken Egg				
Producer	14.450	22.750	18.634,88	1.780,10
Wholesale	19.800	26.900	21.946,51	1.778,62
Traditional Market	19.400	30.750	24.151,16	2.561,61
Modern Market	24.200	32.650	27.494,19	2.255,32
Shallots				
Producer	13.900	36.350	21.766,28	5.081,42
Wholesale	16.700	50.050	28.604,65	6.801,81
Traditional Market	22.450	57.250	34.863,95	7.288,98
Modern Market	28.800	51.300	36.662,79	4.916,16
Red Chilies				
Producer	13.150	59.550	27.755,81	12.092,53
Wholesale	12.600	79.450	33.548,84	16.681,67
Traditional Market	18.900	88.300	40.355,81	18.263,30
Modern Market	32.050	74.700	47.718,60	12.345,72
Bird's Eye Chilies				
Producer	13.600	46.750	27.120,93	7.683,70
Wholesale	13.150	68.500	32.147,67	11.412,13
Traditional Market	18.350	77.450	39.179,07	12.590,36

Modern Market	30.800	64.000	46.337,21	8.419,28
Cooking Oil				
Producer	9.200	19.050	12.159,30	2.974,16
Wholesale	11.000	20.000	13.990,70	3.017,49
Traditional Market	12.150	21.800	15.182,56	3.196,41
Modern Market	13.700	24.500	16.720,93	3.064,22

Source: data processing results.

For the price of chicken meat, during the year of observation it fluctuated very high. This condition occurs at all levels of business actors. The highest fluctuations were in traditional markets, with a deviation of 2,809.47. The price of chicken meat per kilogram once reached Rp.39,650. Then, even though the average price of beef in the modern market was the highest, however, the lowest price during the observation period was in the modern market, amounting to Rp.31,050. This illustrates that price fluctuations in the modern market are the highest, where the standard deviation reaches 22,412.76. For the chicken egg commodity, the lowest price ever sold at the producer level was Rp.14,450. Meanwhile, the highest price at the producer level reached Rp.22,750. The striking price difference can be seen from the deviation value from the price offered by traditional markets, which is 2,561.61. For shallots, the price offered by traditional markets ranges from Rp.22,450 to Rp.57,250. This price range causes the price of shallots in traditional markets to reach a deviation of 7,288.98, the highest among other levels of business actors.

Red chilies are one of the most widely consumed food ingredients by the people of North Sumatra. The lowest price of red chili during the observation period was Rp.12,600, which was actually sold by the wholesalers. The highest price from wholesalers reached IDR 79,450. The highest price for red chili commodities from all levels of business actors was formed from traditional markets, reaching Rp.88,300. Prices from traditional markets throughout 2019-2022 have a very high deviation, amounting to 18,263.30. In general, the price deviation of all levels of business actors is relatively high. The red chili commodity is one of the biggest contributors to inflation in North Sumatra Province. Several factors shape the price fluctuation of red chilies, such as Eid and Eid al-Adha moments, limited supply, end-of-harvest conditions, and indications of stockpiling which have increasingly made the price of red chilies very volatile. Intervention efforts from the regional government bureau are needed so that the fluctuations and increases in chili prices that have continued to this day can be effectively suppressed.

From the table above it can also be seen that the lowest minimum price for Bird's Eye Chilies is at the wholesaler level, which is IDR 13,150. While the highest price is at the traditional market level which once reached Rp. 77,450. The highest deviation value is the price of Bird's Eye Chilies in traditional markets, with a range of Rp. 18,350 to Rp. 77,450. Meanwhile, the cooking oil commodity once reached the lowest price of IDR 9,200 per kilogram, this price was offered at the producer level. Meanwhile, the highest price ever reached Rp.24,500, which was offered at the modern market. The standard deviation of the selling price for each level of business actor does not appear to be too much different, with a range of 2,974.16 to 3,064.22.

The description of price developments among groups of business actors shows that most of the price deviation at the producer level is the lowest compared to prices in the final market. It can also be interpreted that the margin obtained by farmers due to price fluctuations is not as large as the margin obtained in the final market.

Price Difference Test at the Business Actor Group Level

Based on the results of the differential test through the independent t-test, it is known that there are several commodities that have significant price differences in each group of business actors. The commodities in question include rice, beef, chicken eggs, and red chilies. Meanwhile, for the commodities of chicken meat, shallots, Bird's Eye Chilies, and cooking oil, there is at least 1 price comparison between groups of business actors which are not significantly different.

Table 2. Price Difference Test for 8 Food Commodities at the Business Actor Group Level.

	Wholesale	Traditional Market	Modern Market
Rice			
Producer	-72,093***	-27,562***	-73,794***
Wholesale		-32,267***	-77,753***
Traditional Market			-50,300***
Chicken Meat			
Producer	-2,558	-21,044***	-20,643***
Wholesale		-19,009***	-18,586***

Traditional Market			0,542
Beef			
Producer	-9,719***	-16,782***	-9,681***
Wholesale		-8,206***	-7,396***
Traditional Market			-4,984***
Chicken Egg			
Producer	-8,630***	-11,596***	-20,219***
Wholesale		-4,636***	-12,665***
Traditional Market			-6,423***
Shallots			
Producer	-5,282***	-9,666***	-13,8168**
Wholesale		-4,117***	-6,296***
Traditional Market			-1,342
Red Chilies			
Producer	-1,844*	-3,772***	-7,575***
Wholesale		-1,805*	-4,477***
Traditional Market			-2,190**
Bird's Eye Chilies			
Producer	-2,396	-5,361***	-11,055***
Wholesale		-2,713***	-6,561***
Traditional Market			-3,099**
Cooking Oil			
Producer	-2,834***	-4,541***	-7,005***
Wholesale		-1,778	-4,163***
Traditional Market			-2.278**

Description: *** significant alpha 1%; ** significant alpha 5%, dan * significant alpha 10%.

Most of the highest commodity prices are between the prices of the producers and the modern market. In the rice commodity, the most striking price difference is the price from the wholesalers and the price offered in the modern market, with a value of -77.753. Meanwhile, the difference in the lowest price is between the price at the producer and the price at the traditional market which is -27.562. The highest price difference for the chicken meat commodity is between the producer and traditional market prices of -21.044. While prices in traditional markets with modern markets are relatively not much different. The comparison between prices from producers and prices in traditional markets for the beef commodity experienced the highest difference of -16.782. Meanwhile, the lowest price difference is between the traditional market price and the modern market price. Meanwhile, the price of chicken eggs at the producer and the price offered at the modern market has the highest difference. The same thing was also found in the commodities of shallots, red chilies, bird's eye chilies, and cooking oil. The difference in target consumers in the modern market which

tends to lead to the upper middle class is one of the causes, besides also providing commodities originating from imports. Furthermore, the price of bird's eye chilies at the level of producers and wholesalers does not show a significant difference. Meanwhile, for cooking oil, prices are relatively the same between wholesalers and traditional market prices, with a difference of only -1.778.

The results of the different test show that prices from farmers (producers) for eight food commodities experience significant differences in most groups of business actors, except for prices for beef producers and cayenne pepper farmers who do not differ significantly from prices from wholesalers. This indicates that if prices increase in the final market, it will not have a significant impact on the welfare of farmers.

Coefficient of Variation and Change in Food Prices

One important parameter that can be used to monitor food availability is price stability in the market. The more unstable the price, indicating that the availability of these foodstuffs is

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increasingly erratic. Prices of food commodities in the market tend to fluctuate. Viewed from the supply side, this is inseparable from agricultural commodities which have seasonal characteristics. At harvest time, production is abundant, so prices will fall. During the off-season, prices are very high, because there are not many goods on the market. Viewed from the demand side, it is known that there are certain times when the demand for food commodities soars. Demand for food commodities at that time will increase and push prices in the market also increase.

Information on price developments for strategic foodstuffs at any time is urgently needed in order to determine the availability and adequacy of food. The occurrence of food price fluctuations will affect the magnitude of the level of community access and if it continues will have an impact on food insecurity. Based on the foregoing, an early detection system is needed regarding precise and accurate conditions of

food supply and prices, so that anticipation and response can be immediately carried out against the possibility of various upheavals in society (Susilowati & Gunawan, 2020). One approach that can be used to obtain precise, accurate and up-to-date data and information is to use panel data obtained periodically or periodically (time series). This panel data method can describe the dynamics of price developments over a relatively long period of time and can predict future trends in food prices (Wahyuningsih et al., 2020).

To monitor fluctuations in food prices on a regular basis, it can be done by analyzing the coefficient of variation of strategic food prices. The use of the coefficient of variation is to see the distribution/distribution of the data from the calculated average. The smaller the coefficient of variation, the more homogeneous or unstable (stable) the data, while the larger the variation coefficient, the more volatile (unstable) data.

Table 3. Coefficient of Price Variation of Strategic Foodstuffs in Retail Trade of North Sumatra Province in 2018-2022.

Periode	Rice	Chicken Meet	Beef	Chicken Egg	Shallots	Red Chilies	Bird's Eye Chilies	Cooking Oil
Jan-18	0,93==	2,43=	0,30==	1,04=	4,69=	8,87*	3,87=	0,17==
Feb-18	0,65==	3,03=	0,29==	0,50==	1,81=	3,14=	3,73=	0,00==
Mar-18	0,00==	1,79=	0,02==	1,16=	1,95=	3,50=	4,06=	0,19=
Apr-18	0,84==	1,87=	0,13==	1,73=	2,00=	18,62**	21,13**	0,17==
Mei-18	0,00==	3,77=	0,22==	1,35=	0,76==	18,13**	5,68*	0,00==
Jun-18	0,23==	4,56=	0,52==	0,66==	3,42=	6,29*	15,60**	0,19=
Jul-18	0,26==	6,83*	0,00==	4,55=	5,87*	5,66*	11,34**	0,34=
Agu-18	0,23==	7,74*	0,43==	1,37=	4,71=	19,34**	9,25*	0,95==
Sep-18	0,00==	4,18=	0,10==	1,95=	5,59*	16,06**	5,39*	0,20==
Okt-18	0,21==	1,28=	0,43==	1,26=	6,58*	8,72*	3,05=	0,00==
Nov-18	0,00==	3,96=	0,08==	0,54==	5,85*	9,58*	6,94*	0,20==
Des-18	0,38==	7,87*	0,71==	3,92=	2,38=	4,20=	19,33**	1,02=
Jan-19	0,23==	7,39*	0,00==	0,12==	2,22=	8,08*	14,28**	0,20==
Feb-19	0,23==	2,05=	0,80==	2,06=	0,89==	1,48=	4,16=	0,20==
Mar-19	0,23==	1,26=	0,00==	1,18=	7,52*	13,79**	8,41*	0,23==
Apr-19	0,00==	5,39*	0,00==	4,84=	0,68==	10,72**	16,54**	0,00==
Mei-19	0,26==	2,37=	0,06==	0,33==	1,70=	10,23**	5,91*	0,23==
Jun-19	0,22==	4,61=	2,47=	0,72==	2,11=	4,39=	14,38**	0,51==
Jul-19	0,00==	5,73*	1,63=	0,65==	7,63*	10,00*	5,00=	0,29==
Agu-19	0,00==	6,27*	0,00==	0,32==	10,16**	8,74*	7,54*	0,00==
Sep-19	0,20==	7,85*	0,48==	1,10=	1,68=	20,77**	18,06**	0,00==
Okt-19	0,00==	2,17=	0,00==	0,00==	9,74*	13,89**	4,23=	0,21==
Nov-19	0,26==	1,87=	0,00==	1,20=	3,01=	12,89**	12,68**	0,33==
Des-19	0,25==	7,15*	0,00==	2,47=	10,91**	11,66**	18,06**	1,47=
Jan-20	0,23==	5,62*	0,00==	1,62=	3,28=	5,03*	9,20*	1,04=

Feb-20	0,00$^{==}$	1,68$^{=}$	0,00$^{==}$	0,63$^{==}$	4,72$^{=}$	10,65**	2,26$^{=}$	0,19$^{==}$
Mar-20	0,20$^{==}$	4,46$^{=}$	0,06$^{==}$	0,20$^{==}$	4,23$^{=}$	16,67**	16,76**	0,17$^{==}$
Apr-20	0,00$^{==}$	2,68$^{=}$	0,57$^{==}$	0,34$^{==}$	12,44**	4,29$^{=}$	3,90$^{=}$	0,19$^{==}$
Mei-20	0,00$^{==}$	13,93**	0,76$^{==}$	0,93$^{==}$	1,54$^{=}$	12,51**	4,38$^{=}$	0,20$^{==}$
Jun-20	0,20$^{==}$	5,30*	0,00$^{==}$	2,74$^{=}$	17,81**	10,46**	19,23**	0,35$^{==}$
Jul-20	0,00$^{==}$	6,72*	0,24$^{==}$	3,41$^{=}$	7,72*	20,16**	4,67$^{=}$	0,56$^{==}$
Agu-20	0,20$^{==}$	3,09$^{=}$	0,07$^{==}$	1,60$^{=}$	1,21$^{=}$	10,21**	16,40**	0,67$^{==}$
Sep-20	0,00$^{==}$	1,92$^{=}$	0,00$^{==}$	0,44$^{==}$	2,23$^{=}$	12,11**	2,20$^{=}$	0,87$^{==}$
Okt-20	0,23$^{==}$	4,07$^{=}$	1,30$^{=}$	0,38$^{==}$	3,81$^{=}$	11,94**	1,23$^{=}$	0,22$^{==}$
Nov-20	0,00$^{==}$	2,50$^{=}$	0,00$^{==}$	0,80$^{==}$	4,08$^{=}$	6,37*	15,02**	0,42$^{==}$
Des-20	0,26$^{==}$	3,26$^{=}$	0,68$^{==}$	1,96$^{=}$	1,40$^{=}$	15,54**	11,28**	1,06$^{=}$
Jan-21	0,00$^{==}$	2,77$^{=}$	0,17$^{==}$	1,23$^{=}$	2,90$^{=}$	9,30*	6,70*	0,61$^{==}$
Feb-21	0,00$^{==}$	0,33$^{==}$	0,00$^{==}$	2,00$^{=}$	1,91$^{=}$	15,67**	18,44**	0,00$^{==}$
Mar-21	0,58$^{==}$	5,02*	0,06$^{==}$	2,77$^{=}$	1,70$^{=}$	7,46*	8,28*	0,45$^{==}$
Apr-21	0,26$^{==}$	3,31$^{=}$	2,89$^{=}$	0,43$^{==}$	1,66$^{=}$	15,03**	10,06**	0,28$^{==}$
Mei-21	0,00$^{==}$	5,02*	1,57$^{=}$	0,54$^{==}$	3,29$^{=}$	15,13**	5,93*	0,82$^{==}$
Jun-21	0,22$^{==}$	2,59$^{=}$	0,08$^{==}$	0,97$^{==}$	1,36$^{=}$	3,18$^{=}$	8,14*	0,43$^{==}$
Jul-21	0,22$^{==}$	4,20$^{=}$	0,13$^{==}$	0,19$^{==}$	0,13$^{==}$	8,20*	10,45**	0,86$^{==}$
Agu-21	0,24$^{==}$	1,69$^{=}$	0,14$^{==}$	1,38$^{=}$	3,35$^{=}$	5,16*	5,83*	0,95$^{==}$
Sep-21	0,22$^{==}$	1,08$^{=}$	0,00$^{==}$	0,97$^{==}$	1,71$^{=}$	4,97$^{=}$	2,45	0,18$^{==}$
Okt-21	0,23$^{==}$	3,49$^{=}$	0,00$^{==}$	2,17$^{=}$	0,88$^{==}$	15,85**	4,95	2,62$^{=}$
Nov-21	0,00$^{==}$	1,14$^{=}$	0,15$^{==}$	4,09$^{=}$	1,87$^{=}$	16,62**	12,05**	1,13$^{=}$
Des-21	0,37$^{==}$	4,02$^{=}$	0,21$^{==}$	3,71$^{=}$	3,61$^{=}$	6,07*	8,93*	0,67$^{=}$
Jan-22	0,37$^{==}$	5,46*	0,04$^{==}$	3,53$^{=}$	1,41$^{=}$	6,93*	5,29*	1,42$^{=}$
Feb-22	0,00$^{==}$	7,52*	0,58$^{==}$	-1,54$^{==}$	-3,21$^{==}$	-16,73**	-6,81*	13,33**
Mar-22	0,00$^{==}$	3,28$^{=}$	1,12$^{=}$	1,56$^{=}$	1,65$^{=}$	7,43*	3,94$^{=}$	0,19$^{==}$
Apr-22	0,00$^{==}$	7,15*	0,46$^{==}$	3,98$^{=}$	7,70*	18,34**	8,37*	0,22$^{=}$
Mei-22	0,00$^{==}$	0,00$^{==}$	7,15*	0,46$^{==}$	3,98$^{=}$	7,70*	18,34**	8,37*
Jun-22	0,00$^{==}$	5,88*	0,50$^{==}$	1,31$^{=}$	8,07*	23,00**	15,58**	0,76$^{=}$
Jul-22	0,00$^{==}$	-2,45$^{==}$	-0,22$^{==}$	-0,17$^{==}$	-8,71*	-10,60**	-27,60**	-4,94$^{=}$
Agu-22	0,50$^{==}$	3,80$^{=}$	0,94$^{==}$	2,31$^{=}$	9,25*	11,66**	6,48*	0,49$^{==}$
Sep-22	0,61$^{==}$	1,47$^{=}$	0,00$^{==}$	1,06$^{=}$	4,22$^{=}$	30,18**	11,83**	1,71$^{=}$

Description: $^{==}$ very stable; $^{=}$ stable; * volatile; ** very volatile.

During 2018-2022, the coefficient of variation of food ingredients can be grouped into 4 (four) parts. Commodities Rice, beef and cooking oil are food ingredients that have a small coefficient of variation. This condition illustrates that this food commodity has a very stable price. The price of chicken eggs during the observation period can be said to be stable. The price of chicken meat can be seen that 18 periods are quite volatile, 1 period is considered fluctuating, and the other 35 periods are classified as stable. Meanwhile, red chilies and bird's eye chilies have a high coefficient of variation. This condition greatly impacted inflation in North Sumatra. There is a tendency for inflation to increase when there is an increase in the price of red chilies.

North Sumatra Province has great potential for food availability, especially for staple food (rice) and horticulture. Based on observations of the coefficient of variation in rice prices, information was obtained that rice prices in North Sumatra during 2018-2022 were relatively very stable. The

coefficient of variation in rice prices is at a level below 1.0. Stable rice prices are supported by sufficient availability, considering that North Sumatra Province is a national food barn and there is a government policy to stabilize rice prices. This commodity is the main food commodity for the people of Indonesia, almost the entire population of Indonesia consumes rice every day. This causes the rice commodity to have a very strategic value, apart from controlling the livelihoods of many people, it can also be used as a parameter for the country's economic and social stability (Pusvita, 2021). Scarcity or non-fulfillment of rice needs in the community due to the high price, can have an impact on inflation and social unrest (Satya, 2016).

For horticultural commodities, the prices of red chilies, bird's eye chilies and shallots experienced quite fluctuating price changes. Chili commodities often have high fluctuations because they can soar at one time, then drop at a certain time. Until now, the government has not succeeded in reducing the high fluctuations in chili prices. Chili is a food that cannot be stored for a long time. Therefore, the condition of chili stocks will be greatly influenced by weather, disease and harvest

season. Actually, chili price fluctuations can be suppressed if there is a buffer stock for chili commodities. Some of the chilies that are harvested will be processed first so that they can be stored for a long time. However, the buffer stock strategy for chili commodities is difficult to implement because Indonesian people prefer to consume fresh chilies. Meanwhile, the cost of storing fresh chilies is still very expensive. Thus, when the price is harvest season, the price of chili will be very low and when the availability of chili is low, the price of chili will drop quite a lot. The solution that can be done so that the price of chili is more stable is the spread of production, and the cultivation of chili that is sustainable over time.

Chili price fluctuations occur more at the household consumer level. While in the industry, the price is relatively stable. Industrial and retail demand for chili usually uses the ijon trading system (futures trading). The instant noodle industry has tied up most of the chili farmers to supply them with their chili needs. The contract mechanism by providing seeds of all kinds so that chilies enter the industry. This left the industrial sector completely unaffected by price hikes.

Table 4. Changes in Strategic Food Prices in Retail Trade of North Sumatra Province in 2018-2022.

Periode	Rice	Chicken Meet	Beef	Chicken Egg	Red Onion	Red Chili	Cayenne	Cooking Oil
Jan-18	1,88=	-0,78==	-0,50==	-1,50=	-6,26*	-15,09**	-7,00*	-0,37==
Feb-18	-0,46==	-6,58*	-0,04==	-0,52==	2,18=	2,59	-6,38*	0,00==
Mar-18	0,00==	2,81=	-0,04==	-2,10=	2,91=	-7,08*	3,17=	-0,38==
Apr-18	0,84==	1,87=	0,13==	1,73=	2,00=	18,62**	21,13**	0,17==
Mei-18	0,00==	3,77=	0,22==	1,35=	0,76==	18,13*	5,68*	0,00==
Jun-18	0,47==	10,19**	-1,04==	1,33=	-7,45*	6,28	4,51=	0,38==
Jul-18	0,47==	17,62**	0,00==	11,11**	-13,92**	14,83	31,20**	-0,76==
Agu-18	-0,47==	-15,39**	0,83==	-3,07=	-9,48*	-32,38**	22,51**	-1,92=
Sep-18	0,00==	-8,94*	-0,21==	-4,17=	-12,30	29,13**	6,68*	-0,40==
Okt-18	0,47==	-1,15==	-0,33==	-0,52==	11,79**	-6,66*	-5,93*	0,00==
Nov-18	0,00==	9,23*	-0,17==	0,78==	12,82**	-16,56**	-13,46**	-0,40=
Des-18	0,92=	19,77**	-0,17==	6,67*	6,08*	4,69=	52,45**	-0,81=
Jan-19	0,45==	-15,34==	0,00==	-0,24==	-4,83=	-15,53**	-24,83**	0,41==
Feb-19	0,45==	-1,98==	-1,59==	-4,70=	1,66=	0,29==	6,04*	-0,41==
Mar-19	-0,45==	-2,23==	0,00==	-2,53=	16,78**	36,80**	-16,67**	0,00==
Apr-19	0,00==	5,39*	0,00==	4,84=	0,68==	10,72**	16,54**	0,00==
Mei-19	0,45==	-1,45=	0,00==	0,70==	0,55==	-9,73*	-5,56*	0,41==
Jun-19	0,00==	-10,07**	-5,00	1,62=	2,55=	-2,89=	27,33**	-0,81==
Jul-19	0,00==	5,30*	-2,04=	1,14=	-14,59**	-3,48=	-5,63	-0,41==
Agu-19	0,00==	-12,57**	0,00==	0,22==	-20,07**	15,03**	-10,25**	0,00==
Sep-19	-0,45==	16,85**	-0,29==	-2,70=	-3,08=	-33,68**	-35,73**	0,00==
Okt-19	0,00==	2,42=	0,00==	0,00==	24,89**	-24,24**	8,70*	0,41==
Nov-19	0,00==	-1,58=	0,00==	-1,39=	5,57*	-24,70**	-24,33**	0,82==

Des-19	0,45⁼	17,63^{**}	0,00⁼⁼	6,22[*]	28,19^{**}	34,87^{**}	47,11^{**}	3,64⁼
Jan-20	-0,45⁼	-11,32^{**}	0,00⁼⁼	-3,50⁼	-7,04[*]	-1,90⁼	-17,44^{**}	1,95⁼
Feb-20	0,00⁼	2,29⁼	0,00⁼	1,15⁼	-10,36^{**}	18,22^{**}	-2,04	-0,38⁼
Mar-20	-0,45⁼	-9,19[*]	0,00⁼	0,23⁼	11,05^{**}	-25,48^{**}	-30,10^{**}	0,00⁼⁼
Apr-20	0,00⁼	-0,59⁼⁼	0,33⁼	-0,23⁼⁼	28,59^{**}	-8,72[*]	-6,62[*]	0,00⁼
Mei-20	0,00⁼	37,74^{**}	1,53⁼	-2,06⁼	-2,16⁼	-15,83^{**}	-1,33	-0,39⁼⁼
Jun-20	0,20⁼	5,30[*]	0,00⁼	2,74⁼	17,81^{**}	10,46^{**}	19,23^{**}	0,35⁼
Jul-20	0,00⁼	-12,88^{**}	0,50⁼	7,03[*]	-16,62^{**}	64,36^{**}	11,51^{**}	1,19⁼
Agu-20	0,20⁼	3,09⁼	0,07⁼	1,60⁼	1,21⁼	10,21^{**}	16,40^{**}	0,67⁼
Sep-20	0,00⁼	1,92⁼	0,00⁼	0,44⁼⁼	2,23⁼	12,11^{**}	2,20⁼	0,87⁼
Okt-20	-0,45⁼	8,31[*]	2,61⁼	0,65⁼⁼	8,78[*]	-17,18^{**}	3,03⁼	0,37⁼⁼
Nov-20	0,00⁼	-0,15⁼⁼	0,00⁼	1,94⁼	1,08⁼	18,10^{**}	36,59^{**}	1,11⁼
Des-20	-0,45⁼	4,93⁼	1,65⁼	4,16⁼	-1,71⁼	37,05^{**}	24,87^{**}	2,17⁼
Jan-21	0,00⁼	-0,14⁼⁼	-0,37⁼	-1,73⁼	-6,28[*]	-16,83^{**}	-11,88^{**}	1,06⁼
Feb-21	0,00⁼	0,14⁼⁼	0,00⁼	-4,60⁼	3,68⁼	-27,76^{**}	-34,94^{**}	0,00⁼
Mar-21	0,45⁼	-11,24	0,12⁼⁼	-6,21[*]	4,70⁼	20,28^{**}	-17,30^{**}	1,03⁼
Apr-21	-0,44⁼⁼	1,83⁼	1,75⁼	0,00⁼⁼	2,87⁼	-26,19^{**}	-19,53^{**}	0,68⁼⁼
Mei-21	0,00⁼⁼	9,63[*]	1,25⁼	-0,83⁼⁼	-7,42[*]	-21,75^{**}	-8,56[*]	2,02⁼
Jun-21	-0,45⁼	-5,80[*]	0,20⁼⁼	2,07⁼	-2,91⁼	-0,82	20,61^{**}	0,33⁼
Jul-21	0,45⁼	-8,77[*]	0,00⁼⁼	0,20⁼⁼	-0,32⁼⁼	-7,32[*]	24,37^{**}	1,97⁼
Agu-21	0,00⁼⁼	0,96⁼⁼	-0,32⁼	3,63⁼	-3,92⁼	-7,91[*]	-6,83[*]	2,22⁼
Sep-21	-0,45⁼	-0,15⁼⁼	0,00⁼	-2,20⁼	-3,33⁼	11,42^{**}	3,82	0,00⁼
Okt-21	-0,45	7,72[*]	0,00⁼	-5,08[*]	-2,13⁼	14,01^{**}	-11,36^{**}	6,46[*]
Nov-21	0,00⁼⁼	0,29⁼⁼	0,28⁼	10,45^{**}	-4,39⁼	-30,94^{**}	26,43^{**}	3,03⁼
Des-21	0,90⁼	9,77[*]	0,43⁼⁼	8,91[*]	8,14[*]	-12,58^{**}	18,16^{**}	1,60⁼
Jan-22	0,37⁼⁼	5,46[*]	0,04⁼⁼	3,53⁼	1,41⁼	6,93[*]	5,29[*]	1,42⁼
Feb-22	0,00⁼⁼	-3,47⁼	2,64⁼	-3,97⁼	9,78[*]	64,01^{**}	-13,52^{**}	0,00⁼⁼
Mar-22	0,00⁼⁼	7,52[*]	0,58⁼	-1,54⁼	-3,21⁼	-16,73^{**}	-6,81[*]	13,33^{**}
Apr-22	0,00⁼⁼	6,50[*]	-1,30⁼	3,53⁼	3,14⁼	-15,82^{**}	-6,49[*]	0,00⁼⁼
Mei-22	0,00⁼⁼	-15,50^{**}	1,00⁼	8,24[*]	19,95^{**}	48,32^{**}	16,96^{**}	0,46⁼⁼
Jun-22	0,00⁼⁼	-11,29^{**}	-1,03⁼	1,94⁼	17,08^{**}	78,41^{**}	43,02^{**}	-1,15⁼
Jul-22	0,00⁼⁼	-2,45⁼	-0,22⁼⁼	-0,17⁼⁼	-8,71[*]	-10,60^{**}	-27,60^{**}	-4,94⁼
Agu-22	1,33⁼	5,73[*]	-1,86⁼	4,90	-18,85^{**}	-3,67[*]	-8,92[*]	-1,00⁼
Sep-22	1,30⁼	-1,24⁼	0,00⁼⁼	-2,51⁼	9,52[*]	-51,28^{**}	-13,89^{**}	-3,82⁼

Description: ⁼⁼ very stable; ⁼ stable; [*] volatile; ^{**} very volatile.

CONCLUSION

Based on observations of price developments, it is known that of the eight commodities analyzed, only rice whose prices tend to be stable within a relatively limited range. Meanwhile, the prices of the commodities of chicken, beef, chicken eggs, shallots, red chilies, bird's eye chilies, and cooking oil tend to fluctuate greatly every month. Meanwhile, chicken meat, beef, chicken eggs and cooking oil showed an upward trend in prices from 2019 to 2022. An overview of price developments among groups of business actors shows that most of the price deviations at the producer

level are the lowest compared to prices in the final market. This can be interpreted that the margin obtained by farmers due to price fluctuations is not as large as the margin obtained in the final market.

Based on the results of the independent t different test, it was found that there was a significant difference in the price of rice in each group of business actors tested. Likewise with the different test results from the prices of beef, chicken eggs and red chili which have significant differences in the selling prices of all test groups. The results of different tests on the commodities of chicken meat, bird's eye chilies, and cooking oil showed that most of the test groups had significant price differences. From the results of the different test it is also known that the prices from farmers in eight commodities experience significant differences compared to the prices sold from all groups of business actors, except for prices for beef producers and bird's eye chilies farmers which are not significant to prices from wholesalers. This phenomenon indicates that if prices increase in the final market, it will not have a significant impact on the welfare of farmers (producers).

Based on the value of the coefficient of variation, rice, beef and cooking oil are food ingredients with very stable prices. The price of chicken eggs can be categorized as stable. Meanwhile, the price of chicken meat is more volatile. Meanwhile, red chilies and bird's eye chilies have a high coefficient of variation. This condition can also be seen from the magnitude of price changes for the two commodities, where out of 57 observation periods, there were 21 periods for red chili and 18 periods for bird's eye chilies which were classified as very volatile. This has had quite a big impact on North Sumatra's inflation. In the future, another calculation method (Prakoso, 2022; Riani, 2021) is needed to see the robustness of the results.

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